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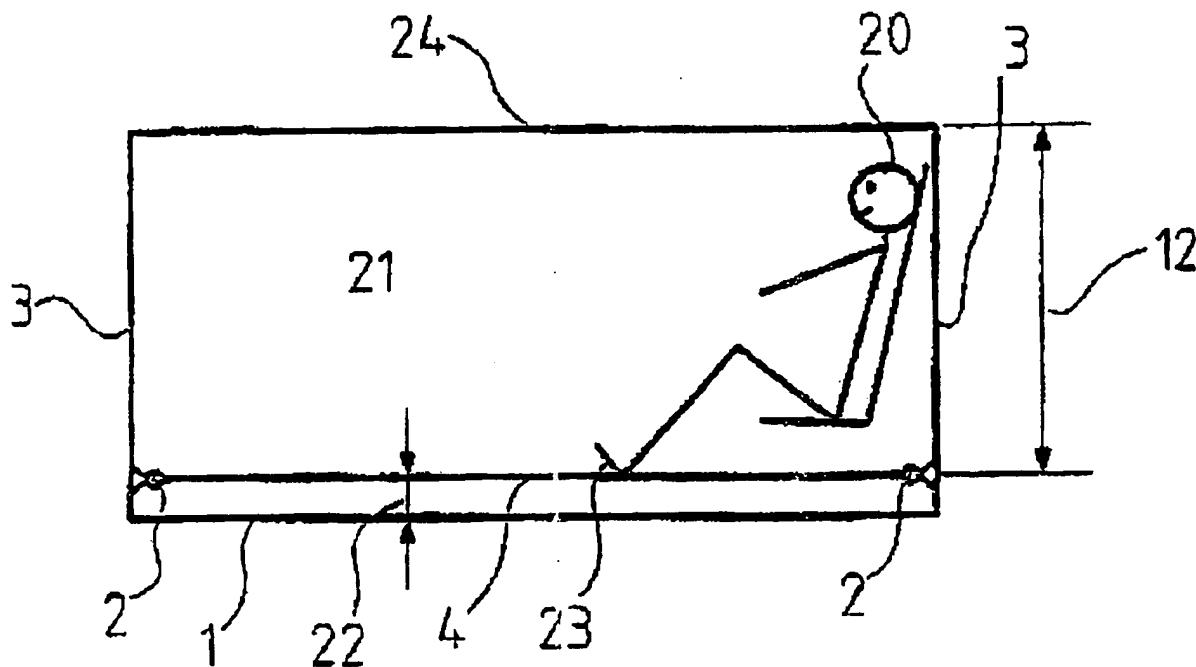
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(54) Titre : PLANCHER DE SECURITE POUR VEHICULES BLINDES

(54) Title: SAFETY FLOOR IN ARMOURED VEHICLES



(57) Abrégé/Abstract:

An apparatus is proposed for protecting the crew 20 of an armoured vehicle from mines by providing an intermediate floor 4 above the vehicle floor 1, wherein the intermediate floor 4 may be lowered e.g. when the vehicle is stationary so that, for climbing out and sitting up, the crew is not adversely affected by a reduced internal clearance height.

**ABSTRACT**

(Fig. 1)

**Safety floor in armoured vehicles**

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An apparatus is proposed for protecting the crew 20 of an armoured vehicle from mines by providing an intermediate floor 4 above the vehicle floor 1, wherein the intermediate floor 4 may be lowered e.g. when the vehicle is stationary 10 so that, for climbing out and sitting up, the crew is not adversely affected by a reduced internal clearance height.

**Claims**

1. Apparatus for protecting against the shock effect of a land mine particularly for the crew of an armoured vehicle by means of attachment of protective elements to the vehicle floor,  
5 characterized in  
that a vertically adjustable intermediate floor (4) is fastened above the vehicle floor (1) to fastening points (2) on the side walls (20) of a vehicle inner compartment (21), wherein from case to case a distance (22) between vehicle floor and intermediate floor or, in a second setting, a "zero" distance (22) is adjustable.  
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15
2. Apparatus according to claim 1  
characterized in  
that the vertical adjustment of the intermediate floor (4) is adjustable alternately between the two raised and lowered operating positions and said vertical adjustment may be linked to other functions such as tailgate open/closed.  
20  
25
3. Apparatus according to claim 1 and 2  
characterized in  
that the intermediate floor (4) by means of elastic constituents or structures in its construction and by means of applying tensile force at lateral fastening points (2) is adjustable into a "raised" operating position preferably through tensioning in order to achieve a compartment clearance height (12) in the vehicle inner compartment.  
30  
35
4. Apparatus according to one of claims 1 - 3  
characterized in  
that the intermediate floor (4) by means of removing the tensile force at lateral fastening points (2) is

capable of swivelling away so that it rests on the vehicle floor (1) in a "lowered" operating position with a greater compartment clearance height (13) in the vehicle inner compartment.

5

5. Apparatus according to one of claims 1 - 4 characterized in that the anti-mine effect and hence the adjustment of the intermediate floor (4) into "raised" position is automatically provided and need not be brought about by manual intervention of the operator.
- 10 6. Apparatus according to one of claims 1 - 5 characterized in that the elastic structure or the material of the intermediate floor (4) affords protection against high temperatures and/or vibrations.
- 15 7. Apparatus according to one of claims 1 - 6 characterized in that separate footrests (8) or further additional elements (15) may be mounted on the intermediate floor (4) so as to be decoupled from the vehicle floor (1) in order to enable optimum adaptation for different ergonomic sizes and hence ergonomically more advantageous seating positions for a crew.
- 20 8. Apparatus according to one of claims 1 - 7 characterized in that by means of an air supply (10) and openings (18) in the intermediate floor (4) ventilation and deventilation as well as heating and cooling are possible in the vehicle inner compartment (21).
- 25 30 35 9. Apparatus according to one of claims 1 - 8 characterized in

5 that by using translucent material for the intermediate floor (4), preferably a material having a mesh structure, indirect illumination (9) of the vehicle inner compartment (21) from below is possible through the intermediate floor (4).

10. Apparatus according to one of claims 1 - 9 characterized in

10 that the intermediate floor (4) also affords protection against so-called overmatch danger, such as e.g. simultaneous protection in the event of explosion of two mines.

15. Apparatus according to one of claims 1 - 10 characterized in

15 that the intermediate floor (4) through the use of suitable material for its manufacture and/or by means of adaptation or integration of suitable additional components in the intermediate floor additionally has the effect of intercepting fragments of the vehicle floor (1), so-called secondary fragments, in the event of explosion of a mine or of narrowing the fragment cone in the event of the action of hollow-charge mines upon the vehicle floor and hence affords protection against fragments.

20. Apparatus according to one of claims 1 - 11 characterized in

20 that the protective apparatus is provided also at other surfaces (16, 19) inside or outside of a vehicle.

25. Apparatus according to one of claims 1 - 12 characterized in

25 that the intermediate floor (4) is also suitable and usable for transporting shock-sensitive and highly sensitive appliances (11).

## **Safety floor in armoured vehicles**

The invention relates to the protection of personnel in armoured vehicles against the effect of the explosion of 5 mines, which are laid on or in the ground.

Said vehicles generally have on the chassis a smooth floor and between the floor and the ground as much ground clearance as possible, which is ensured by suitably 10 designed wheel or track running gear, so that the vehicle may travel off-road with as little hindrance as possible.

The explosive blast effect of the mine exploding under the vehicle acts upon, deforms and damages the relatively 15 large-area vehicle- or body floor and may cause considerable damage in the vehicle. Besides the permanent deformation of the vehicle floor, an even greater elastic deformation also occurs. All parts fastened to or deposited on the vehicle floor are accelerated by the mine 20 shock in such a way that they suffer extreme damage and fly like projectiles in the inner compartment. When the legs of the crew of the vehicle are resting on the floor, explosion of a mine results in critical injury of the crew. To prevent this, footrests are usually used, which are 25 mechanically decoupled from the floor and mounted at a sufficient distance from the vehicle floor.

The drawbacks of said special solution are:

- 30 - the footrests have to be adjusted individually for each person for better ergonomics;
- the adjusted fixed position leads in the long run to physical discomfort;
- the feet are also placed on the vehicle floor, with the known consequences in the event of a mine 35 exploding;
- footrests may prove a serious hindrance in confined areas or when climbing in and out.

According to prior art, various proposals have been made for avoiding mine damage to the vehicle.

From DE 3119786 it is known to attach two-dimensional 5 armoured elements to the underside of the vehicle as a protection against mines.

In DE 19631715 the vehicle floor is equipped with a deflector of a wedge-shaped construction relative to the 10 floor, wherein the deflector may also be equipped with a gas generator for the purpose of support from the inside and for counteracting the explosion.

In DE 19653283 a three-dimensional cell serving as a crew 15 compartment is elastically suspended separately in the vehicle housing in order thereby also to eliminate shock effects, which act from the outside upon the vehicle, in relation to the personnel in the vehicle.

20 In further applications deformation bodies are attached to the vehicle floor in order to alleviate the blast effect of mines upon the vehicle.

In DE 19941928 damping elements are provided in an 25 intermediate floor under the vehicle and are intended to alleviate and absorb the effect of mines.

The object of the invention is the reliable protection of the crew in the vehicle against mine shock effects and the 30 improvement of known apparatuses.

Said object is achieved according to the invention by the characterizing features of claim 1. Further features arise from the sub-claims.

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According to the invention an intermediate floor is installed in the vehicle and attached at a specific

distance from the vehicle floor. Transmission of the shock, which is induced by the mine blast, to the feet of the crew is thereby prevented without the readiness for action of the crew being restricted by a fixed leg

5 position. The intermediate floor is mechanically decoupled from the vehicle floor and fastened predominantly to the sides of the vehicle inner compartment. The intermediate floor is fastened flexibly and may be lowered onto the vehicle floor. For the crew there is, in any case, a floor  
10 without obtrusive footrests.

The advantages of the vehicle floor construction according to the invention lie in particular in an automatic provision of mine protection for the crew, provided the

15 intermediate floor is not lowered. There is no need for adaptation to different ergonomic sizes of the crew, as is the case with footrests. In the travel, i.e. non-lowered position the crew may move their legs freely. In the lowered state the intermediate floor lies flat on the  
20 vehicle floor so that, compared to a vehicle without an intermediate floor, the internal height of the crew compartment is practically not reduced for climbing out and sitting up. The material of the intermediate floor, e.g. containing a plastics material such as PE or aramide, may  
25 be selected in such a way that an anti-fragment effect is simultaneously provided by the intermediate floor.

Setting of the intermediate floor into the "lowered" and "non-lowered" operating positions may also be linked to  
30 other vehicle settings, such as e.g. "close tailgate", or vehicle travel in order automatically to produce a non-lowered intermediate floor in protective position.

Embodiments of the invention are diagrammatically  
35 illustrated in the drawings and described in detail below. The drawings show:

Figure 1: a cross section of a vehicle with intermediate floor

Figure 2: a cross section of a vehicle with a lowered intermediate floor

5 Figure 3: a basic view of the intermediate floor with additional built-in devices

Figure 4: an anti-mine floor in the alternative installation.

10 An inner compartment 21 of an armoured vehicle shown in cross section in Figure 1 has a vehicle floor 1 or body floor and an intermediate floor 4 provided at the distance 22 above the latter. The intermediate floor 4 is fastened, from case to case also in an articulated manner, to the

15 fastening points 2 on the side walls 3. Between the intermediate floor 4 and the housing roof 24 there is the clearance height 12. A vehicle operator 20 supports his feet 23 on the intermediate floor 4.

20 In Figure 2 the intermediate floor 4 is lowered so that it is resting substantially on the vehicle floor 1 and a clearance height 13, which is greater than the clearance height 12 in Figure 1, is produced between vehicle floor 1 and vehicle roof 24.

25 In Figure 3 the intermediate floor 4 is represented by a mesh-like structure, which allows light 9 to pass from below into the compartment above the intermediate floor. Sensitive equipment 11 or other appliances 15 may be

30 fastened on the protective floor 4 and, depending on the operating position of the floor, are raised or lowered vertically with the latter. Equally, footrests 8 for operators may be fastened on the intermediate floor 4. By virtue of the mesh-like structure of the intermediate

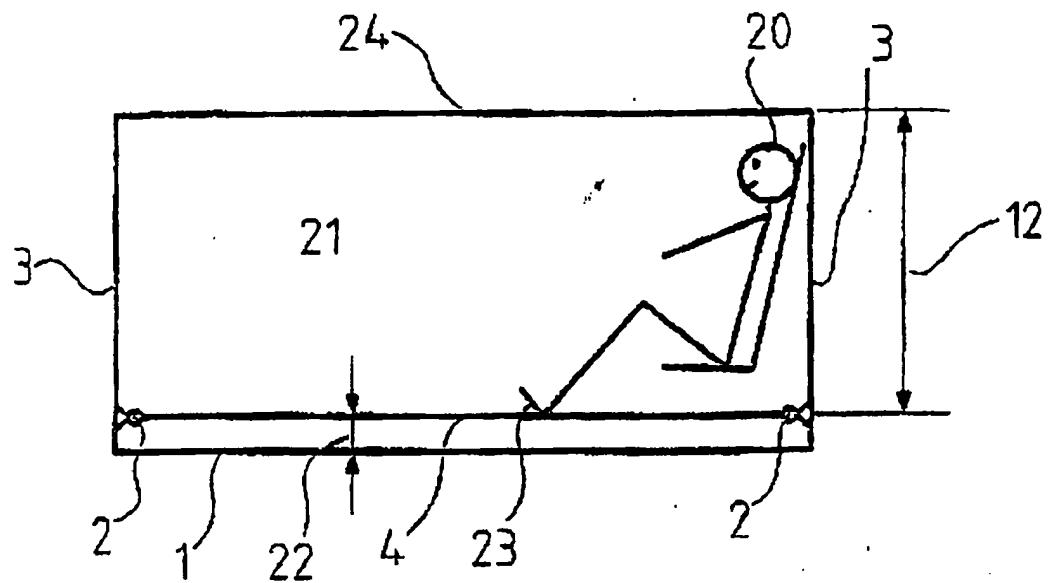
35 floor 4 or by means of openings 18, ventilation and deventilation as well as heating and cooling are possible through the intermediate floor 4.

Figure 4 reveals how use of the protective floor is possible also at other boundary surfaces 16 of a vehicle and it is equally possible to design a use at boundary surfaces 19 of a housing 17, which is adapted outside of 5 the actual vehicle inner compartment 21.

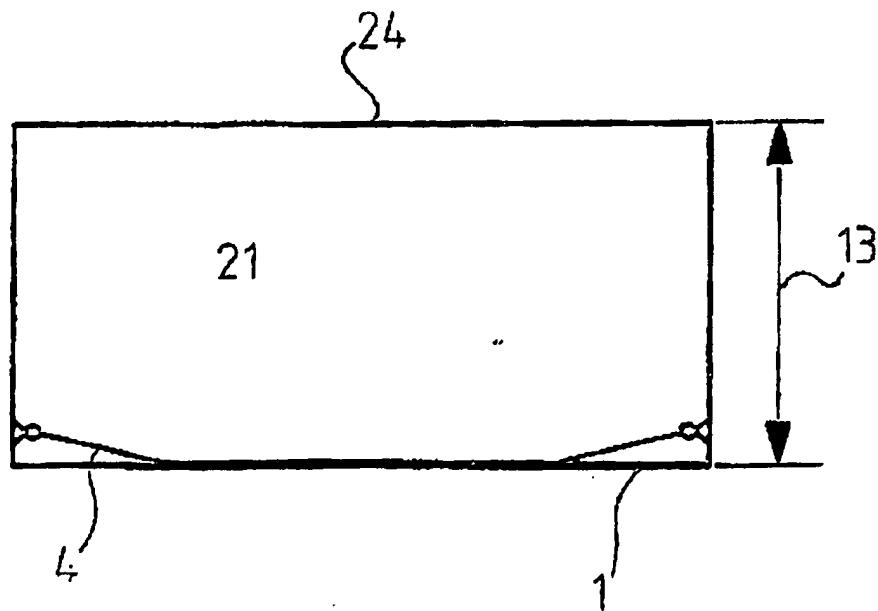
In the combat state, the intermediate floor 4 is in the "raised" or "tensioned" position and forms the floor surface for the crew in a vehicle compartment. In said 10 state, there is a distance 22 between the vehicle floor 1 and the intermediate floor 4. The intermediate floor is functionally subdivided and made from suitable, partially flexible material to enable it to assume the two "lowered" or "relaxed" and "raised" or tensioned" positions, 15 depending on the required setting. The raised position is preferably linked to another function in the vehicle so that no manual intervention is needed to bring the intermediate floor into the protective or raised position. Said function may be e.g. "close hatch" or readiness for 20 action. For climbing in and out of the vehicle compartment the lowered position of the intermediate floor is assumed so that a greater compartment height 13 is available to the crew. The feet 23 of the operator 20 rest on the intermediate floor 4 so that they are protected in the 25 raised position of the intermediate floor against the effect of a mine from below. The intermediate floor is preferably brought into the raised or lowered position by means of a suitable, non-illustrated motor drive.

## List of reference characters

- 1 vehicle floor
- 2 fastening point
- 5 3 side wall
- 4 intermediate floor (protective floor)
- 5
- 6
- 7
- 10 8 footrests
- 9 lighting
- 10 introduction of air
- 11 appliance
- 12 clearance height
- 15 13 clearance height
- 14
- 15 additional element
- 16 boundary surface
- 17 housing
- 20 18 openings
- 19 boundary surface
- 20 vehicle operator
- 21 inner compartment
- 22 distance
- 25 23 feet
- 24 housing roof

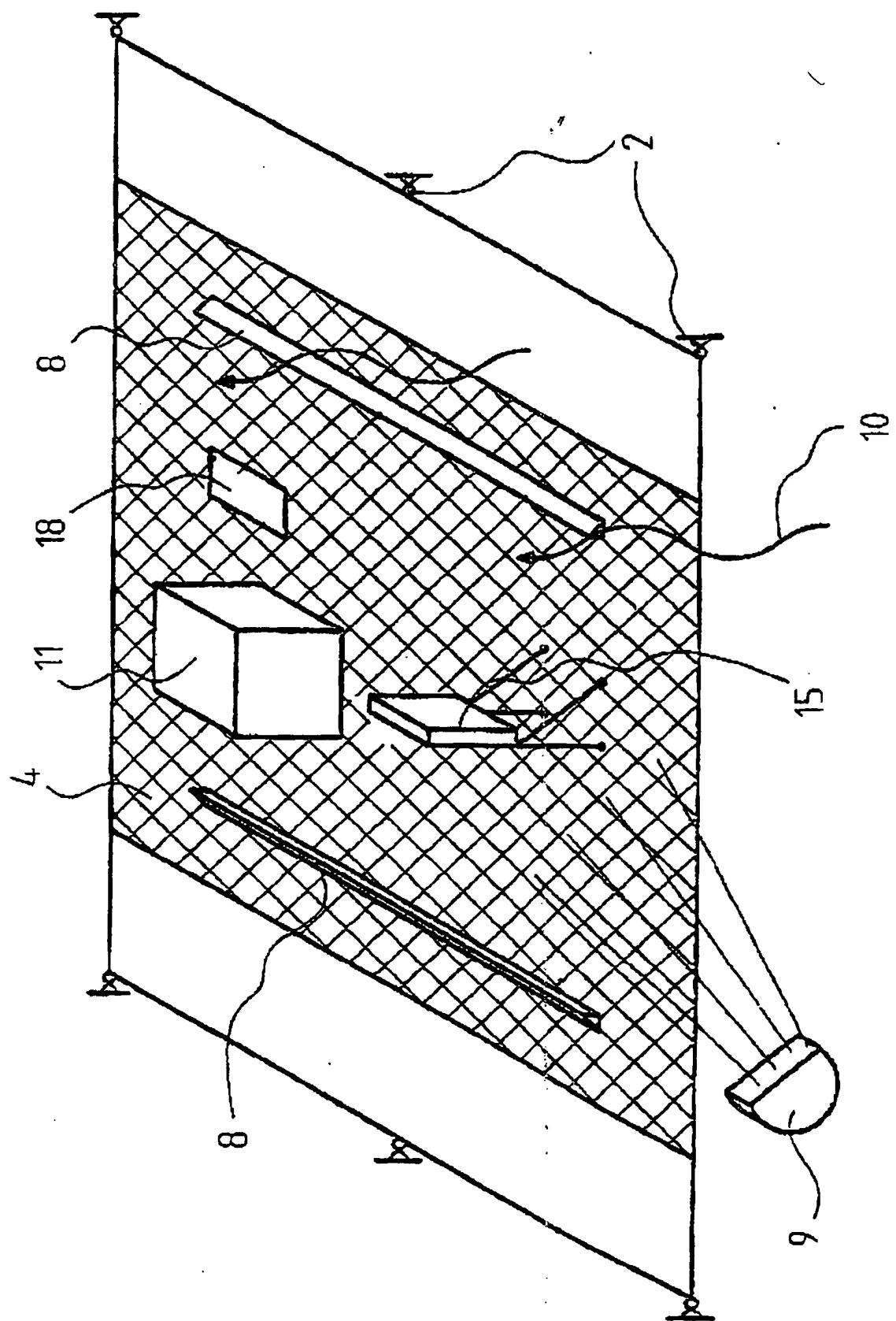


## Figur 1



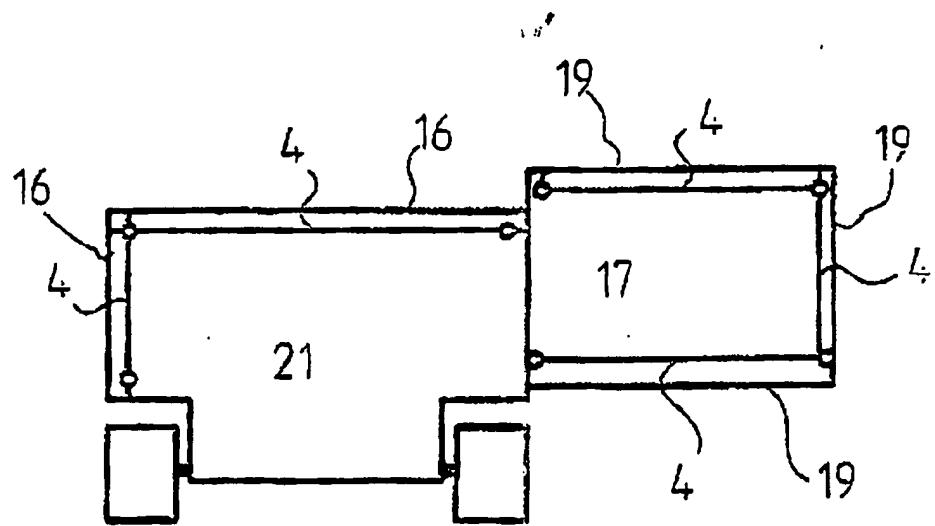
Figur 2

2/3



Figur 3

3/3



Figur 4

